Identifying individual smooth newts (*Lissotriton vulgaris*) from ventral spot patterns.

Mark Edwards BSc (Hons) AMSB, UOL PG Conference, April 2014. #pgconf14

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Mark Edwards (@Mark_Edwards1)

Google Images

Sexually dimorphic spot patterns

Sexually dimorphic spot patterns

Population studies

- Population size / dynamics
- Changes in population
- Temporal changes in individuals

Method

Capture individuals
Mark or identify then release
Capture more individuals
Check for previously caught animals
Mark or identify release
Percentage of recaptures can be used to calculate overall population size
Known as capture-mark-release or C-M-R

Amphibians historically marked using toe clipping / tipping or pit tagging

Some key assumptions

Marks should not not impinge upon an individual's lifetime fitness

- cause no pain
- little stress
- inexpensive
- Last for the duration of a study

This invalidates toe clipping and other invasive methods

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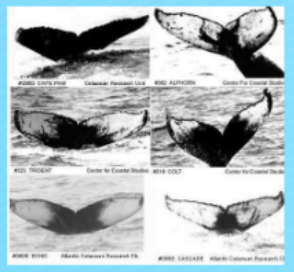
Natural markings are better

- Stripes in zebra
- Blotches in giraffe
- Ear shape / damage in elephant
- Fins / tails in Cetaceans

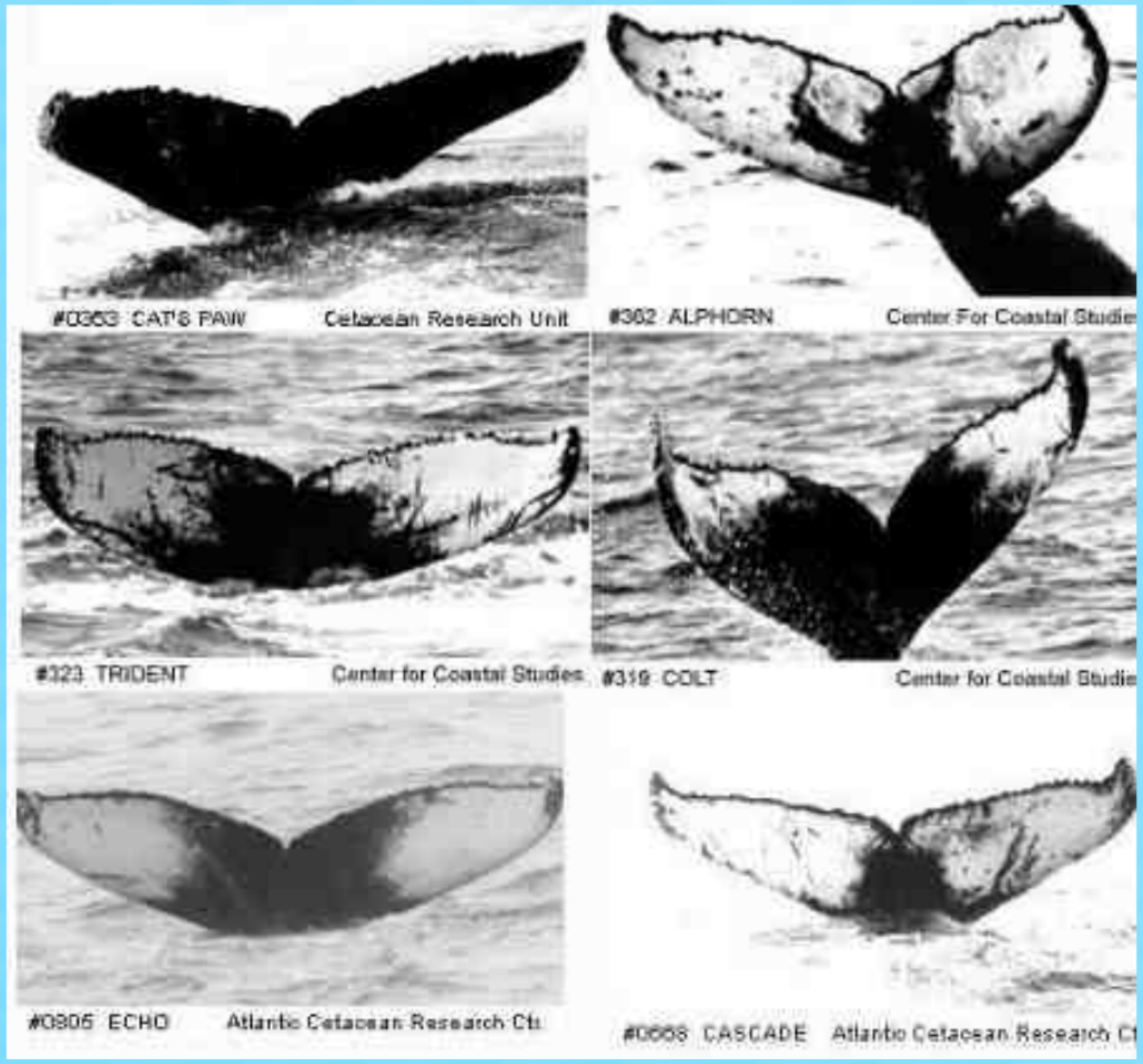
Google images



Great crested newts

Unique markings
Accepted as valid method to identify individuals

Method previously used for smooth newts but not validated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Cetacean Research Unit
#362 ALPHORN
Center For Coastal Studie
#323 TRIDENT
Center for Coastal Studies
#319 COLT
Center for Coastal Studie
#0905 ECHO
Atlantic Cetacean Research Ct
#0008 CASCADE
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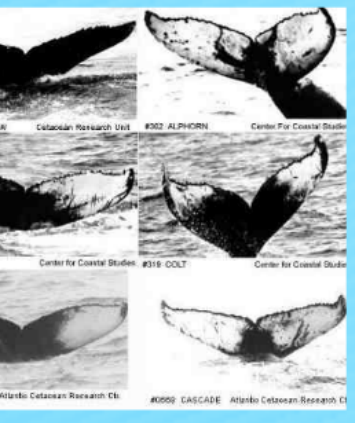

Question?

Can we show that using ventral spots is a valid method of identifying smooth newts?

Edwards, M.T.; Soulsbury, C.D. and Deeming, D.C. (submitted March 2014) Identifying smooth newts (*Lissotriton vulgaris*) using ventral patterns.

Smooth newt method

Large data set (*c.* 500 individuals)
Photographed, measured & weighed
Identified manually using spot patterns

Method

- Imagej landmarks converted to a text file of x,y co-ords
- Exported to MorphoJ
- Procrustes fit
- Principle component analysis
- PCA values exported to PAST
- Tested with NP MANOVA
- PCA values exported to R
- Tested for repeatability using rptR

Ten males & ten females
3 pictures of each
Use multi tool in Imagej
Landmark right armpit & bottom
6 spots in the orange stripe

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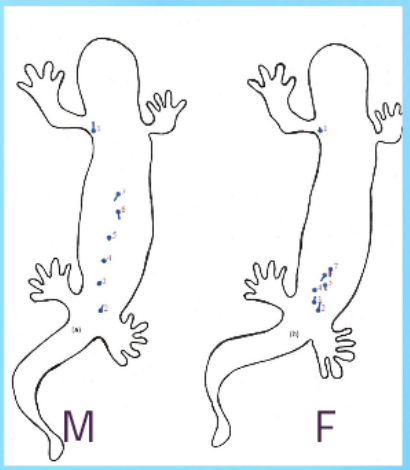
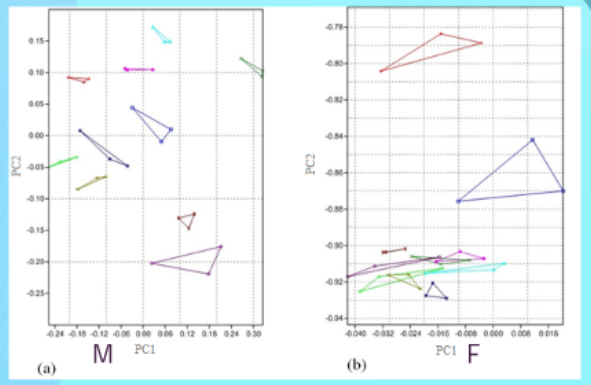
Results

PCA output:
Males v Females
Mostly anterior-posterior variation



PC 1 vs PC 2
Linked by convex hulls



Individuals colour coded
Manova showed:
Males P<0.001
Females P<0.001

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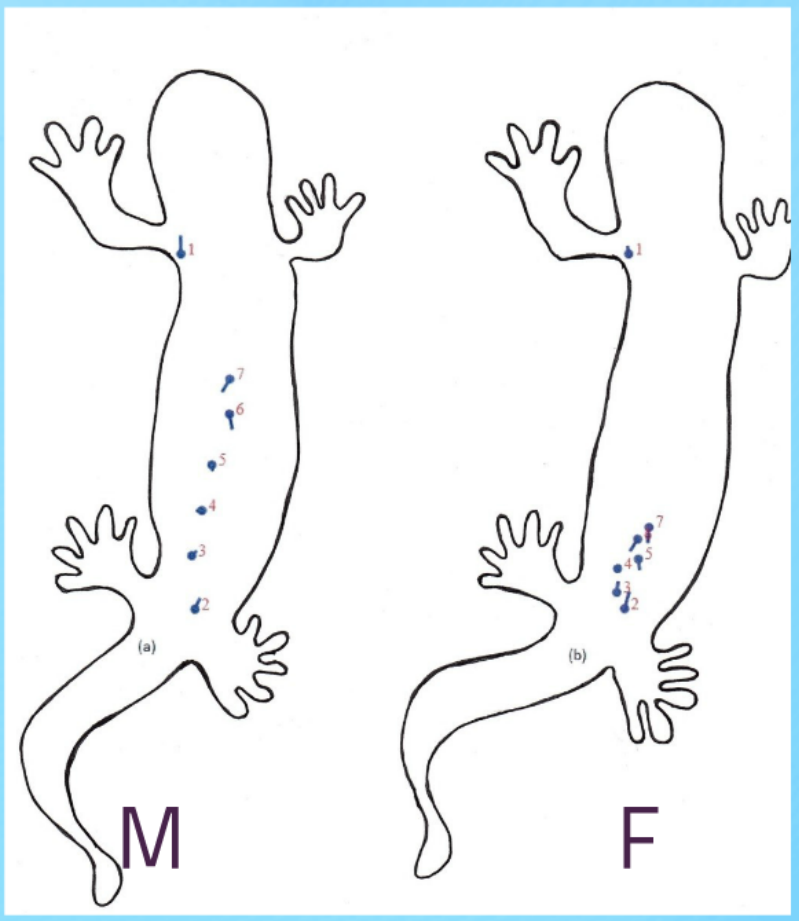

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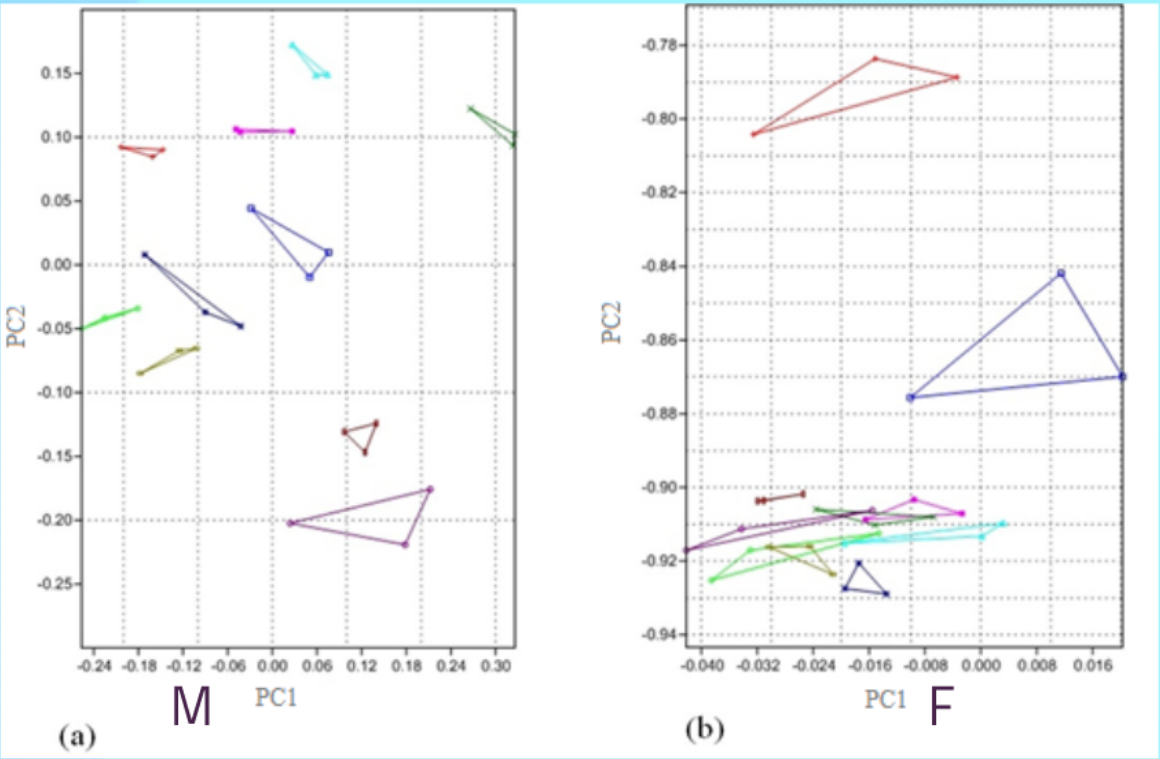

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Males P<0.001

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Conclusions

The method of visual identification for smooth newts has been validated using morphometric software and statistical analysis.

Future work

Many other methods use computers to generate algorithms to identify animals or at least narrow the field

Thanks to my co-authors

Carl Soulsbury & Charles Deeming

Thanks also to Marcello Ruta for statistical help and advice

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1.Image: http://rsb.info.nih.gov/ij/ 2. http://www.flywings.org.uk/Morphol
3.R Core Team 2013. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.
4.PAST: http://folk.uio.no/ohammer/past: Ver. 2.17

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4.PAST: http://folk.uio.no/ohammer/past; Ver.2.17